

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently amended) A superconducting magnetic field detection element comprising at least one superconducting pick-up loop formed on a common flexible substrate, wherein the common flexible substrate is in a non-planar position, such that the at least one superconducting pick-up loop is operable to detect magnetic fields of differing orientation, and further comprising a flux transformer configured for inductive coupling of detected signals to a superconducting quantum interference device (SQUID).

2. (Withdrawn) A superconducting magnetic field detection element according to claim 1 wherein the common flexible substrate partially extends within a first plane and partially extend within a second plane substantially perpendicular to the first plane such that the at least one superconducting pick up loop is positioned in both the first plane and the second plane.

3. (Withdrawn) A superconducting magnetic field detection element according to claim 1 wherein the common flexible substrate is positioned such that the at least one superconducting pick-up loop describes an arc subtending a predetermined angle about a nominal focus.

Claim 4. (Canceled).

5. (Previously presented) A superconducting magnetic field detection element according to claim 1, comprising a plurality of pick-up loops, and wherein the common flexible substrate is arranged so as to position each of the plurality of pick up loops in a unique plane which is not coplanar with any plane in which another pick up loop is positioned.

6. (Withdrawn) A superconducting magnetic field detection element according to claim 5 comprising a first superconducting pick-up loop positioned in a first plane and a second

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superconducting pick-up loop positioned in a second plane substantially perpendicular to the first plane.

7. (Previously Presented) A superconducting magnetic field detection element according to claim 5 comprising a first superconducting pick-up loop positioned in a first plane and a second superconducting pick-up loop positioned in a second plane substantially parallel to and spaced apart from the first plane.

8. (Withdrawn) A superconducting magnetic field detection element according to claim 5 comprising a first superconducting pick-up loop positioned in a first plane and a second superconducting pick-up loop positioned in a second plane such that the first superconducting pick-up loop and the second superconducting pick-up loop describe an arc along the common flexible substrate that subtends a predetermined angle about a nominal focus.

9. (Withdrawn) A superconducting magnetic field detection element according to claim 1 wherein the common flexible substrate is selected from Hastelloy tape and a partially or fully stabilised zirconia substrate, such as Ceraflex.

10-15. (Canceled).

16. (Withdrawn) (Currently Amended) A superconducting magnetic field detection element according to claim 1 further comprising a superconducting quantum interference device (SQUID) for detecting current induced in the at least one ~~pick-up~~ pick-up loop as a result of a magnetic field passing through the at least one ~~pick-up~~ pick-up loop, wherein the SQUID is inductively coupled to the at least one pick-up loop through the flux transformer formed on the common flexible substrate.

17. (Canceled).

18. (Withdrawn) A superconducting magnetic field detection element according to claim 16 wherein the SQUID is magnetically coupled to the at least one or multiple pick-up loops through a flux transformer formed on the common flexible substrate.

19-20. (Canceled).

21. (Withdrawn) A superconducting magnetic field detection element according to claim 1 wherein a minimum radius of curvature or twist of the common flexible substrate is controlled in order to avoid damage to the element.

22. (Withdrawn) A superconducting magnetic field detection element according to claim 6 wherein the common flexible substrate is twisted in order to provide circuit elements, such as a superconducting pick-up loop, in a third plane.

23. (Currently Amended) A method of forming an element of a superconducting device for detecting magnetic fields, the method comprising:

forming at least one high temperature superconducting pick-up loop on a common flexible substrate, and forming a flux transformer on the common flexible substrate for inductive coupling of detected signals to a superconducting quantum interference device (SQUID); and
positioning the common flexible substrate in a non-planar configuration such that the at least one superconducting pick-up loop is operable to detect magnetic fields of differing orientation.

24. (Withdrawn) A method according to claim 23 further comprising partially extending the common flexible substrate within a first plane and partially extending the common flexible substrate within a second plane substantially perpendicular to the first plane such that the at least one superconducting pick up loop is positioned in both the first plane and the second plane.

25. (Withdrawn) A method according to claim 23 further comprising positioning the common flexible substrate such that the at least one superconducting pick-up loop describes an arc subtending a predetermined angle about a nominal focus.

26. (Canceled)

27. (Previously Presented) A method according to claim 23, wherein a plurality of superconducting pick-up loops are formed on the common flexible substrate, and further comprising arranging the common flexible substrate so as to position each of the plurality of pick up loops in a unique plane which is not coplanar with any plane in which another pick up loop is positioned.

28. (Withdrawn) A method according to claim 27 further comprising positioning a first superconducting pick-up loop in a first plane and positioning a second superconducting pick-up loop in a second plane substantially perpendicular to the first plane.

29. (Previously Presented) A method according to claim 27 further comprising positioning a first superconducting pick-up loop in a first plane and positioning a second superconducting pick-up loop in a second plane substantially parallel to and spaced apart from the first plane.

30. (Withdrawn) A method according to claim 27 further comprising positioning a first superconducting pick-up loop in a first plane and positioning a second superconducting pick-up loop in a second plane such that the first superconducting pick-up loop and the second superconducting pick-up loop describe an arc along the common flexible substrate that subtends a predetermined angle about a nominal focus.

31. (Withdrawn) A method according to claim 23 further comprising the step of detecting current induced in the at least one or multiple pick-up loops as a result of a magnetic field passing through the at least one or multiple pick-up loops.

32-35. (Canceled).

36. (Currently Amended) A superconducting gradiometer comprising:
a first high temperature superconducting pick-up loop defining and substantially residing in a first nominal plane; and
a second high temperature superconducting pick-up loop defining and substantially

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residing in a second nominal plane; and a flux transformer configured to inductively couple detected signals to a superconducting quantum interference device (SQUID);

wherein the first pick-up loop and the second pick-up loop are formed on a common flexible substrate, wherein the first nominal plane and the second nominal plane are substantially parallel, and wherein the first nominal plane and the second nominal plane are sufficiently spaced apart to allow the first pick-up loop and the second pick-up loop to act to distinguish local magnetic fields from background magnetic fields.

37. (Currently Amended) A superconducting gradiometer according to claim 36 that is axial, ~~and implemented through the use of a superconducting flux transformer pick-up loop structure patterned on the common flexible substrate.~~

38. (Currently Amended) A superconducting gradiometer according to claim 37 ~~wherein the~~ further comprising a flux transformer ~~[[is]]~~ inductively coupled to ~~a detection means the SQUID~~ for detecting current induced in either the first or second pick-up loops as a result of a magnetic field passing through the first or second pick-up loops.

39-40. (Canceled).

41. (Currently Amended) A superconducting gradiometer according to claim 37 further comprising a flexible strip-line conductor connecting each of the first and second pick-up loops to ~~[[the]]~~ a flux transformer.

42-49. (Canceled).

50. (Currently Amended) A superconducting gradiometer according to claim 41 wherein an additional length of flexible superconducting tape covers each of the strip-line~~[[,]]~~ conductors forming a ground plane.

51-60. (Canceled).